Forage Seed System in Tanzania- A Review Report

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Summary

As feed and feeding take most of the input to realized increased livestock productivity, access to good quality forages for livestock especially dairy and beef animals is key. Over year, and especially in sub-Saharan Africa forage breeding and improvement has been dormant, and rely on maintaining materials developed decades ago, and still with limited access by livestock producers. We set out to understand the prevailing forage seed system in Tanzania, the functioning and use of improved forages for a country with the third highest livestock population in Africa. While subtle forage seed is happening largely by public institutions, there exist room for improvement especially through engaging public private partnership, and explore use of elite forages developed elsewhere that may be beneficial.

Introduction

The use of improved forage seed in Tanzania remains a major challenge for development of a strong and steady animal feed resource base. Usually the assurance of availability of quality and quantity forage biomass depend on the investment dedicated on well-established forage technologies (Maleko et al., 2018; Mwendia et al. 2018; Kizima, 2015). The forage sector is a system that assures availability of quality seeds/planting materials through the forage seed supply chain. This entails all pathways informal and/or formal to obtain and access to quality seeds by livestock producers (Mkani and Peniel 2020).

The government laid a policy framework to implement the formal seed system in 1973. The enactment of the Seed Act No. 29 of 1973 led to the formation of the Tanzania Seed Company Limited (TANSEED), a public seed company responsible for seed production, processing and marketing. The formation of the Tanzania Official Seed Certification Institute (TOSCI) established under the seed Act No 18, 2003, with mandate for seed certification and promotion of quality agricultural seeds, either produced or imported into the country for sale, and establishment of Government foundation seed farms. The organizational structures has not yet brought a significant improvement on production and availability of improved quality seeds/planting materials through the forage seed supply chain.

At present, research reports that forage seed systems in Tanzania operates largely at informal level, compared to food seed system (rice, maize and beans) which is most developed, available and accessed by many farmers in the country than forage and pasture seed (AGRA, 2016). An efficient model of forage and pasture seed production and/or importation is desirable for improvement of the present forage seed availability of proven forage technologies in the country. This will support increased forage and pasture production to serve livestock population during wet and dry season for increased livestock productivity.

Therefore, this report gives highlights of the current state of forage seed system, challenges and opportunities in forage-seed-value-chain improvement in Tanzania. This is useful information for the value chain actors with view if improving forage seed supply to farmers.

Approach

We used different approaches to gather information on forage seed system in Tanzania, considering both formal and informal channels. The first step involved literature review where references of the current forage seed production cited within last five years. We contacted key players via e-mails, phone

call and one-on-one talk on forage seed system involved in certification, production and/or selling of forage seed/planting materials or utilization. The contacts reached are as follows;

- Tanzania Official Seed Certification (TOSCI): Responsible for Certification and promotion of quality agricultural seeds produced or imported into the country for sale to safeguarding farming community from poor (fake) seeds from vendors of farm inputs.
- Parastatal Institutions (Sokoine University of Agriculture Farm & Kibaha Farm): For Research and training purposes.
- Government Institutions: Tanzania livestock Research Institute (TALIRI), Livestock Training Agencies (LITA), Livestock Multiplication Unit (LMU), National Insemination center (NAIC).
- Private Farms and Seed Supplier Company. E.g. Kibo Seed Company.
- Small holder farms and individual crop-livestock forage producers.

These are the key stakeholders that play a significant contribution to the development and availability of ruminant livestock feed resources in the livestock industry in Tanzania. Some have setup, technology and technical staffs for seed production, forage and pasture production and conservation in their areas.

Findings

We observed that forage seed system in Tanzania is largely at informal level being done by research, training institutions, government farms and few private farms (Table 1) operating with limited support. Equally, there exist slight participation from small-scale farmers and private sectors in the forage seed production.

According to the findings, the main challenges hampering the development of forage seed production sector is little implementation of the national forage seed policy which is not yet functioning fully or not known by many stakeholders, that highlights important things as:-

- To produce seeds of grasses, legumes and browses for feed resource development in Tanzania with emphasis being placed on small holder seed production in the short run,
- To be self-sufficient in pasture plant seeds and thereby increasing the quality and quantity of feed base for meat and milk production,
- To produce surplus pasture seeds for sale to other countries and
- To produce surplus pasture seeds on large scale in the end.

Other significant challenges outlined to be the cause for under-development of forage seed system are;

- Lack of funds, technical knowhow and machinery to assist in research resiliencies in different research and training centres in Tanzania.
- Quality of the seeds produced has not been controlled to ensure genetic integrity and to meet other quality standards like purity of the seed and germination percentages
- Demand for seed has not been well quantified by different forage seed producing centres and as such in some instances there is a false surplus of seed, and in others a short supply

- Coordination between centres dealing in seed production has been very little, if any.
- Pricing of the seed is variable and the basis for the price tag is not known as in most cases, production costs have not been established.
- Marketing of the seed is done by each centre through own initiative.

Table 1: Summary of Key Forage Seed Sources Contacted

No.	Forage Seed Sources	Phone contacts
1.	Langwira Seed Farm	0782975373
2.	Vikuge Pasture Farm	0713263923
3.	Livestock Multiplication Unit (LMU) - Mafinga	0786021818
4.	Livestock Multiplication Unit (LMU) - Mabuki	625959485
5.	TALIRI - Mpwapwa	656917829
6.	TALIRI - Uyole	759228200
7.	TALIRI -Tanga	754822150
8.	TALIRI - Mabuki	735035062
9.	Sokoine University of Agriculture (SUA)	767069518
10.	LITA - Tengeru	754561205

Demand for forage seed

The discernable advancement in agricultural practices as a result of increase in population size, has led to shrinking of rangelands for being turned into residential and other production activities. Apparently, this has caused a negative effect to a natural livestock production system, livestock producers are forced to reduce their stocks, the pastoralist have started practicing crop-livestock farming, the urban towns and emerging villages have started keeping improved dairy cattle to suit their available land areas, producing quantity and quality milk without affecting the environment. These has raised a huge demand for improved forage seed to farmers for establishing pasture/fodder plots that will enable producing forages of good quality and quantity to feed their ruminant livestock.

Involvement of NGOs e.g. Heifer Project International (HPI), OX–Farm, World Vision and Missionaries in improving smallholder dairy production and environmental management is another effort contributing to high demand for forage seed to ensure that livestock keepers are sustainably while taking care for environment.

Forage seed distribution and marketing

Production of forage seed is largely at informal level, and seeds produced are processed and packaged. The seeds are normally packaged into 1kg packets for Rhodes grass and 15kg for guinea grass. For legumes such as Lucerne packaging is in 50g, 100g and 150g while Desmodium is packed in 500g and

1kg packets. Public government institutions normally do not have processing facilities thus well-controlled seed packaging in not available.

Largely, forage seed distribution in the country is not well organized with limited points of distribution and marketing. Marketing of forage seeds happens via customers purchasing the seeds directly from the producing institutions, and the institutions sell at subsidized prices. In some occasions, stockists and middlemen buy the seeds from producers and sell to farmers and NGOs. The stockists are not specialized to selling forage seed only, but deal with several other farm inputs. Their core business is sale of crops seeds, fertilizer, veterinary drugs and agro-chemicals and forage seed accounts for insignificant income of their total sale because of low demand.

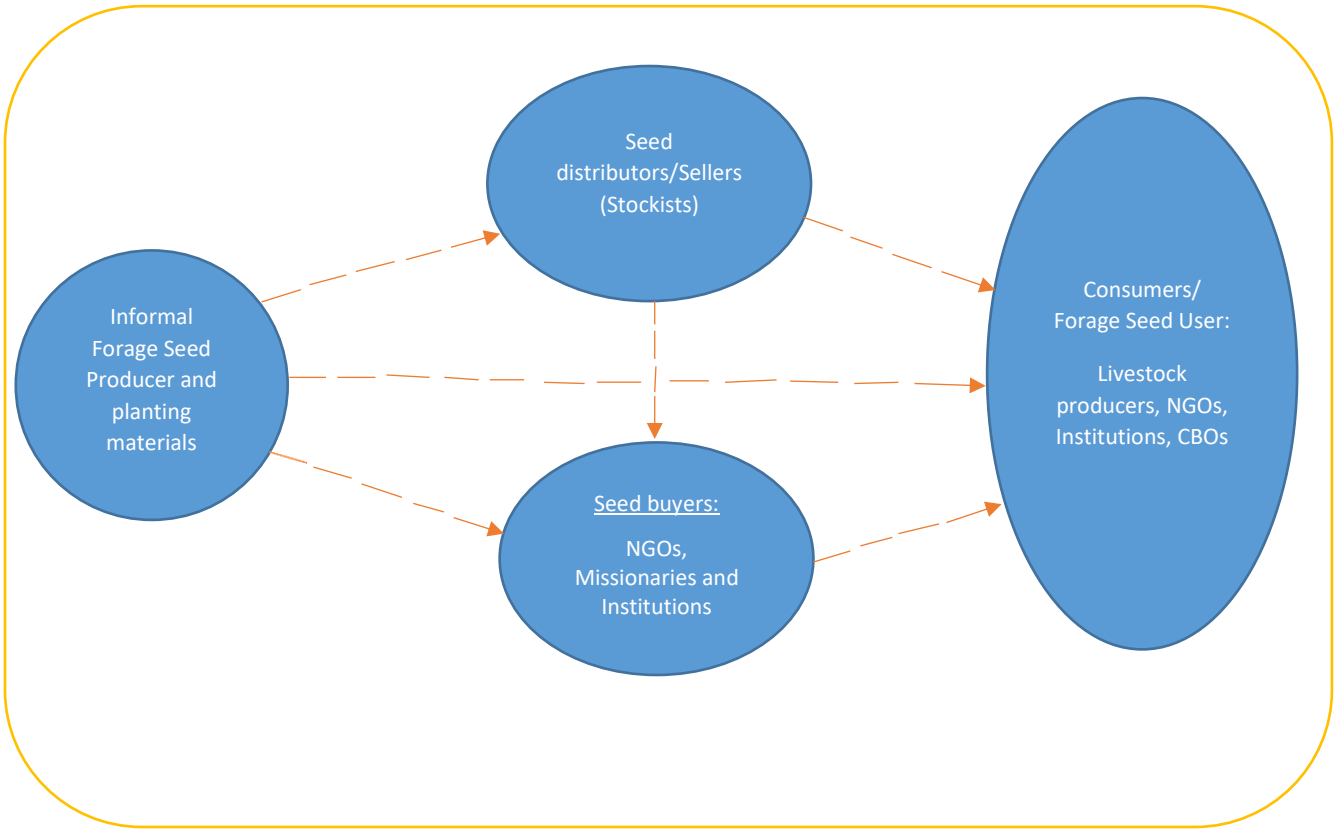

Figure 1: Forage Seed Distribution Model from Producer to Farmers

Figure 2: Different forage plots at Mpwapwa Tanzania Livestock Research Institute

Constraints to seed production

In Tanzania the main challenges for forage seed production reported by producers was high cost of production of forage seed, lack of germplasm for bulking and lack of qualified staff. Also, there is no quantifications of the seed produced and projected demand. This retard the motive of increasing production of forage seed due to the unidentified consumptions of forage seed in a year-round by farmers.

Seed regulations

Essentially, seed regulations is meant to protect consumers and to promote a responsible industry (Mbwambo et al., 2016). The perceived limited participation of private sector in formal forage seed system, and possibly the low volumes of seed in trade is partly due to no seed certification mechanism and regulation enforcement on forage seeds in the country. There is need for well-set seed quality standards in order to guarantee production, packaging and sale of high quality forages.

Constraints in seed marketing

The stockists encounter several constraints while acquiring the seeds from suppliers. First is high price of seeds, and secondly the long distance they travel to reach the source. Seed prices are in (Table 5). Usually, the price fluctuate being high during the wet season and decline during dry season.
Potential consumers for forage seeds in Tanzania include;

1. Small scale dairy farmers,
2. Government farms,
3. Parastatal farms,
4. Non-governmental organization and

5. Soil conservation projects

Figure 3: Harvesting Napier Seed planting materials from a farmer's farm

Table 2: List of informal pasture/fodder multipliers, species produced, scale of operation and their collaborators

No.	Name of multiplier	Species	Current scale of operation	Collaborators	Contact
1	Tanzania Tree Seeds, Morogoro	Chloris gayana, Pennisetum purpureum	Small-Medium scale	Government	
2	The National Artificial Insemination Centre (NAIC) – Arusha	Grasses: Rhodes spp, *Pennisetum purpureum*, Legumes: Medicago sativa, *Desmodium* spp, *Gliricidia sepium*, *Leucaena* spp, *Calliandra* spp, maize fodder	Small-Medium scale	Government	0756946406
3	Tanzania Livestock Research Institute (Tanga, Mpwapwa, Kongwa)	Grasses: *Chloris gayana*, *Pennisetum purpureum*, *Setaria splendida, Brachiaria* spp, *Cenchrus ciliaris*,: Legumes: *Medicago sativa*, *Neonotonia wightii*, *Macroptilium otropurperium*, *Desmodium* spp, *Gliricidia sepium*, *Leucaena* spp, *Calliandra* spp,	Small-Medium scale	Government, NGOs and farmers	0713483126
4	Livestock Multiplication Unit (LMU)	Grasses: *Chloris gayana*, *Pennisetum purpureum*, *Setaria splendida*, *Brachiaria* spp, *Cenchrus ciliaris*, Legumes: , *Desmodium* spp, *Leucaena* spp, *Calliandra* spp	Small-Medium scale	Government, NGOs and farmers	0756675409 and 0782975373
5	Livestock Training Agencies (LITA)-Tengeru - Arusha, Mabuki-Mwanza, Morogoro and Buhuli-Tanga	Grasses: *Chloris gayana*, *Pennisetum purpureum*, *Setaria splendida*, *Brachiaria* spp, *Cenchrus ciliaris*, Legumes: *Desmodium* spp, *Leucaena* spp, *Calliandra* spp	Small-Medium scale	Farmers, Students and Government	
6	Sokoine University of Agriculture (DAARs)	Grasses: *Chloris gayana*, *Pennisetum purpureum, Setaria splendida, Brachiaria* spp, *Cenchrus ciliaris*, Guatemala grass, Legumes: , *Desmodium* spp, *Leucaena* spp, *Calliandra* spp	Small-Medium scale	Students, Farmers, NGOs and Government	0784754574
7	Langwira Pasture Seed Farm	Grasses: *Chloris gayana*, *Pennisetum purpureum, Brachiaria* spp: Legumes: *Medicago sativa*, *Desmodium* spp, *Gliricidia sepium*, *Leucaena* spp, *Calliandra* spp	Large scale	Government and Farmers	
8	Vikuge Pasture Farm	Grasses: *Chloris gayana*, *Pennisetum purpureum*, *Brachiaria* spp: Legumes: *Medicago sativa, Desmodium* spp, *Gliricidia sepium*, *Leucaena* spp, *Calliandra* spp	Large scale	Government and Farmers	0713263923

Table 3: List of Private farms /Companies

No.	Name of multiplier	Species	Current scale of operation	Collaborators	Contact
1	Arusha Seed Companies	Chloris gayana, Brachiaria	Medium-scale		
2	ASAS Group of Companies	Napier, Rhodes grass			0754695540
3	East West Seed Company	Different forage seed varieties	-	Farmers	+255 272 752 596
4	Kibebe Farm - Iringa Tanzania	Napier, Brachiaria, Chloris gayana			0629587064
5	Krishna Seed Company Ltd Arusha Tanzania	Different forage seed varieties	-	Farmers	0786209000
6	Ndoto Farm	Napier, Brachiaria, Chloris gayana	Medium scale	Farmers	0629323231
7	Kibo Seed Agency	Different forage seed varieties	-	Farmers	0755735644
8	Zanz-germ-fena	Different forage seed varieties	-	Farmers	242235048
9	Ilandutwa Dairy Farm	Rhodes grass, Cenchrus grass	Medium – large scale	Farmers	0787615038

Table 4: Organized Farmers group

No.	Name of multiplier	Species	Current scale of operation	Collaborators	Contact
1	MKAF Youth Group - Siha	Maize fodder	Small scale	Farmers	0742357532
2	KIVIWAMA Youth Group – Hai District	Maize fodder	Small scale	Farmers	0655655959
3	UVIWASA Youth Group – Hai District	Maize fodder	Small scale	Farmers	0754286470
4	UPENDO Group – Babati District	Napier and Brachiaria grass	Small scale	Farmers	0784871469
5	HANDO WEMA – Babati District	Napier and Brachiaria grass	Small scale	Farmers	

Table 5: Price of different forage seeds in Tanzania

Forage seed type	Price of forage seed (TSHs)
Pasture grasses	5000- 8000/kg
Herbaceous legumes	5000- 8000/kg
Fodder grasses/usually cuttings	2000- 4000/gunny bag
Fodder trees	7000- 10000/kg

Table 6: Strengths, weaknesses, opportunities and potential threats in forage seed systems in Tanzania

Strengths ➢ High livestock population and second in Africa (cattle, sheep, goats and others) that would require forages for better performance. ➢ Forage seed system for other food crops that could easily incorporate forage species ➢ Forages adapted to various agro ecological zones known in Tanzania ➢ Presence on national and international research institute interested in forages development (TALIRI, ILRI, CIAT) ➢ Government policy –livestock development plan with need to improve livestock productivity ➢ Presence of development agents interested in improved livestock productivity ➢ Case of Rhodes grass (Chloris gayana) a forage species developed in early 60's and still most readily grown and traded forage grass in Tanzania (Lukuyu et al., 2016)	**Weaknesses** ➢ Over reliance on natural pasture grasses despite poor nutritional quality ➢ Limited knowledge on forages including technical know how ➢ Low demand for pasture/forage seeds. In a study (Kizima 2015) *Cenchrus ciliaris* between 2007 and 2010, only 815 kg were purchased in key zones in Tanzania namely (eastern, northern, southern, central and western) ➢ Lack of forage seed system analysis, with the last that was done in (Mwilawa eta al, undated) especially forage seed demand is not quantified ➢ Quality of seed to ensure genetic purity is not there
Opportunities ➢ Existence of private seed companies that could broaden portfolio to include forage seeds ➢ Existence of developed and adaptable forages with better production and utilization attributes ➢ High and growing demand for forage/pasture seeds (Kizima, 2015) ➢ Potential to import improved forage seed developed elsewhere	**Threats** ➢ Climate change- erratic weather patterns ➢ Forage diseases e.g. Napier grass and stunt

Inferences

From the study and observation of the current forage seed system in Tanzania, we infer that:-

- The demand for forage seed is not documented/quantified, and get clouded by perceived surplus of seed and at times short supply.
- The quality of the seeds produced is not properly supervised to ensure genetic integrity and germination percentages.
- Coordination between centers dealing with seed production is limited or not there.
- There is lack of resilient forage seed value chain and the existing one operates with insufficient forage seed research, poor processing and distributing schemes, and limited involvement of private seed companies.
- The primary constraints to forage seed production were lack of technical knowhow and funding.

There is a national forage seed policy which is not yet functional or not known by many and has highlighted the following:

- To produce seeds of grasses, legumes and browses for feed resource development in Tanzania with emphasis being placed on smallholder seed production in the short –run.
- To be self-sufficient in pasture plant seeds and thereby increasing the quality and quantity of feed base for meat and milk production
- To produce surplus pasture seeds for sale to other countries.
- To produce surplus pasture seeds on large scale in the long run.

The government has also laid down seeds regulation through The Seed Act 1973 (Regulation of Standards); Plant Variety Protection Act 2002 and The Seed Act 2003. The purpose of the act is to have the standards for all seeds produced in the country and implementing the legal agreement. The act also spells out seed grades, standards of different crop seeds, restrictions, labelling, seed crop inspection and seed testing. However, the information is not in use by seed producers, thus not benefiting end users. For example variety evaluation and registration, the Seeds Act gives mandate to Tanzania Official Seed Certification Institute (TOSCI) to carry out variety performance tests, which is known as the "National performance Trial (NPT)". The Law requires any seed variety to be released in the country should undergo (1) two Distinctness, Uniformity and Stability (DUS) tests and (2) NPT.

Conclusion

The study has shown that the formal forage production system in Tanzania is weak with limited involvement of the private sector for sustainability. Seed production is mainly carried out by public sector mostly government farms and research institution with limited forage species. Availability of seed by farmers is limited and aggravated by lack of awareness of seed in the market. Further, training and technical support is needed for commercial farm seed growers in the country. A platform that brings together relevant private and public sector actors to jointly address the current challenges and potential development of forage seed sector needs exploring. Further, it may be plausible to consider forage materials developed elsewhere to avoid time lag in developing new materials, and this may mean seed importation, which has worked in other countries.

Acknowledgement

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